# Petiolegall Aphids

## Swollen or disfigured leaves of poplars

**Name and Description—***Pemphigus* spp. [Homoptera: Aphididae]

Adult petiolegall aphids are about 1/13 inch (2 mm) long, usually pale green with a dark thorax, and covered with a waxy substance. They have short, thread-like antennae and lack the terminal abdominal tubules called cornicles that are characteristic of other aphids. At certain times of the year, adults have four clear wings. Immatures, called nymphs, look like smaller versions of the adults. *Pemphigus* spp. aphids are cryptic; they are found within galls on trees (fig. 1) or on roots of their alternate hosts. Eggs are relatively large, given the size of laying females but are less than 1/25 inch (1 mm).

Figure 1. Characteristic marble-sized galls on the petiole of cottonwood leaves induced by the poplar petiolegall aphid, *Pemphigus populitransversus*. *Photo: Herbert A. "Joe" Pase III, Texas Forest Service, Bugwood.org.*

**Hosts—**Aspen, cottonwood, and other *Populus* spp. trees in winter, alternating with annual herbaceous host plants in summer

**Life Cycle—**Petiolegall aphids have complex, 1-year life cycles that alternate between two sets of hosts. Although probably similar in life cycle, considerable confusion exists regarding species' identities within the genus *Pemphigus*, so there may be more species involved than are named here. The poplar petiolegall aphid (*P. populitranversus* Riley) (fig. 1) life cycle is used as an example. Eggs are laid in fall in bark cracks on *Populus* spp. trees. In spring, more or less coincident with the flushing of the poplar foliage, eggs hatch into nymphs that will all become asexually reproducing females. Nymphs feed on developing leaf petioles through tubular, sucking mouthparts. Feeding induces the host plant to produce a swollen growth, called a gall that envelops the developing aphid (fig. 2). As this overwintering form matures, it produces young that remain within the gall until full-grown. These new adult females have wings. The galls split open, and the winged adults fly during late June and July to their summer hosts. Using cracks in the soil, they locate and colonize the roots of plants in the cabbage family. Colonies of nymphs secrete a waxy substance that is believed to protect them from excess moisture. Several asexual female generations may be produced on these summer hosts. At the end of summer, winged adults are produced that fly back to their winter hosts where they give birth to small, mouthless males and females that mate, and then the males die. After mating, each female, which is less than 1/25 inch (1 mm) long, lays one egg that is almost as large as she is and then dies.

Figure 2. When a gall is cut open, numerous petiolegall aphids can be found inside. *Photo: Herbert A. "Joe" Pase III, Texas Forest Service, Bugwood.org.*

The poplar petiolegall aphid forms a spherical green gall with a transverse slit on the petiole of plains cottonwood (fig. 1). It is also a root-infesting pest on cruciferous crops in summer, where it is known as the cabbage root aphid.

Figure 3. Gall produced by the lettuce root aphid, *Pemphigus bursarius*. *Photo: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org.*

The lettuce root aphid, *P. bursarius* (Linnaeus), is a European insect that was accidentally introduced into North America. It produces a flask-like gall on the petioles of Lombardy poplar and hybrid poplars (fig. 3). It is an occasional pest of lettuce crops and is known from lambsquarter and carrot.

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The sugarbeet root aphid, *P. populivenae* Fitch, forms an elongate gall on the mid-vein on the upper side of *Populus* spp. leaves, such as narrowleaf cottonwood, and infests the roots of sugarbeets and other garden plants. Gall shape and location are variable.

The poplar vagabond aphid, *Mordwilkoja vagabunda* (Walsh) [Homoptera: Aphididae], may be confused with *Pemphigus* spp., although its characteristic leathery, distorted galls differ greatly in shape (figs. 4-5). Poplar vagabond aphids have a life cycle similar to other gall-making aphid species in that it overwinters as an egg and alternates between winter and summer host plants. Newly hatched aphids feed on developing leaves of aspen and certain cottonwoods, which produce an enlarged, twisted clump of growth at the leaf base (fig. 4). Several generations of aphids occur within the folds of such galls, which may contain as many as 1600 individuals each. The green galls fade in color and harden, tend to remain on trees, and may not be visible until after normal leaf fall (fig. 5). Galling is concentrated in the upper third of the tree. This Region's summer host plants are not known, although loosestrife is an important summer host in other areas.

Figure 4. A poplar vagabond aphid that was feeding on developing aspen leaf produced a gall of distorted growth that will dry and remain after leaf fall. *Photo: Dave Powell, USDA Forest Service, Bugwood.org.*

Figure 5. Dried gall from poplar vagabond aphid feeding. *Photo: Whitney Cranshaw, Colorado State University, Bugwood.org.*

**Damage—**None of the *Pemphigus* species are economic pests for foresters or arboriculturists. Galled leaves tend to fall from the tree prematurely. Severe infestations can render trees unsightly but cause little to no other injury. There are many other organisms, including aphid, fly, and mite species, that cause galls to form on *Populus* spp. leaves and branches, each with characteristic gall shape and location. Other than aesthetic considerations, these organisms are not known to damage their tree hosts. Serious economic damage can occur on the alternate annual herbaceous summer hosts.

**Management—**Excessive gall formation on host trees can be indicative of an unhealthy condition, relief from which might reduce galling. In some cases, gall-forming insects prefer hosts that are given abundant moisture and/or fertilization, so galls can be a problem in well-tended landscape settings. Given the lack of injury, active management of petiolegall aphid populations is not indicated. If control is desired, application of horticultural oil in spring as leaves begin to expand should kill the overwintered eggs.

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